

ABSTRACT

Growth, quality and cane and sugar yields of 16 sugar cane cultivars were studied in two field trials at different locations and in a pot experiment. There were significant differences ($P < 0.05$) in cane length, diameter, cane fresh weight and quality at 5, 9 and 12 months; in cane number at 3 and 10 months, in flowering as well as in cane and sugar yields at final harvest within and between locations. Maximum sugar yields occurred in cultivars which combined high quality with high cane yield and at each location there were significant correlations between some of the above parameters.

Measurements of apparent free space (AFS) in storage tissues showed that at each age there were significant differences in AFS within and between the cultivars. There were significant positive correlations between AFS and quality at each age and between AFS at 9 and 12 months and final sugar yields. Significant associations were also found between the values of AFS at 5, 9 and 12 months.

Acid and neutral invertase activities differed significantly within and between the cultivars at 5, 9 and 12 months. Acid invertase activity increased to a maximum at 9 months and then decreased at 12 months. Neutral invertase activity also increased between 5 and 9 months, but continued to increase up to 12 months as did quality. In most cases no significant correlations between the activity of the enzymes or their ratio and quality or sugar

yields were found.

It is suggested that the AFS of the storage tissue early in the growth cycle may be used to predict final cane quality and hence as a selection tool in cultivar evaluation and selection programmes of sugar cane. It is also suggested that by increasing levels of AFS, sugar cane breeders may be able to increase the potential sugar yields of sugar cane cultivars.